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G5G G17
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US 5475797 A US 4359319 A

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INT CL⁶ G09B 19/00
ONLINE: WPI

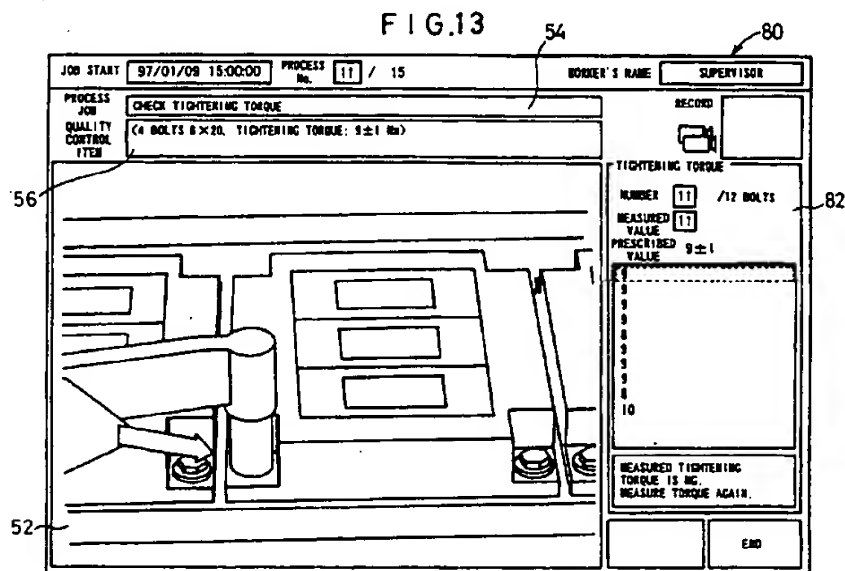
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(54) Abstract Title

Job Aiding Apparatus for Assembly Line

(57) A display unit of a job aiding apparatus disposed at each work station of an assembly line, Fig.1 (not shown) provides a job detail image (52) for showing an instructional picture for the job in hand and a job result display image (82) for showing an entered result. The worker in each of the work stations can perform a job easily according to the job detail shown in the job detail display image, and can easily and accurately confirm the job result according to the job result in the job result display image. In Fig.13, it is a torque setting which can be entered by the worker and compared with the prescribed value; other examples, Figs. 6 and 9 (not shown) may enable a check that the correct component has been chosen or that an assembled component does not provide a pressure leak.



GB 2 327 289 A

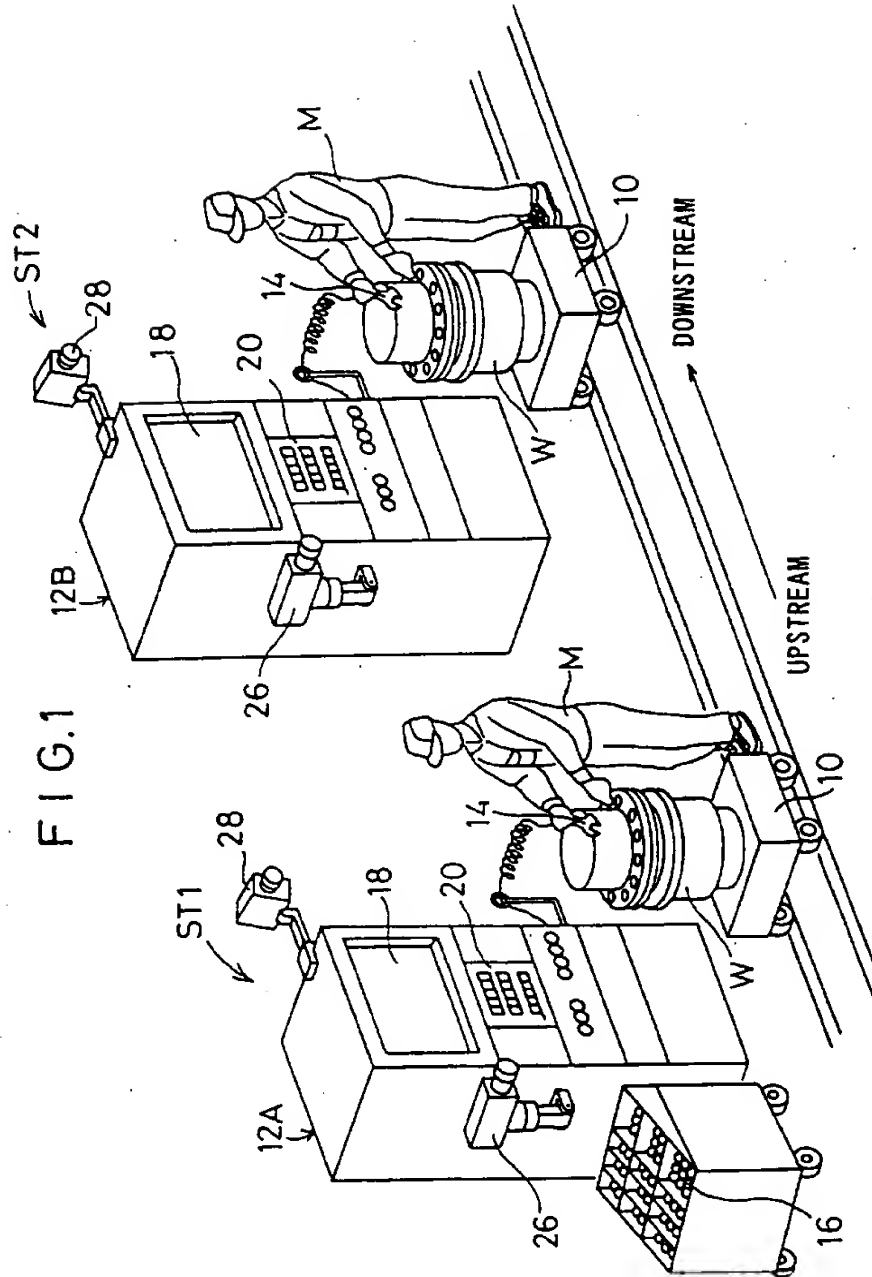


FIG. 2

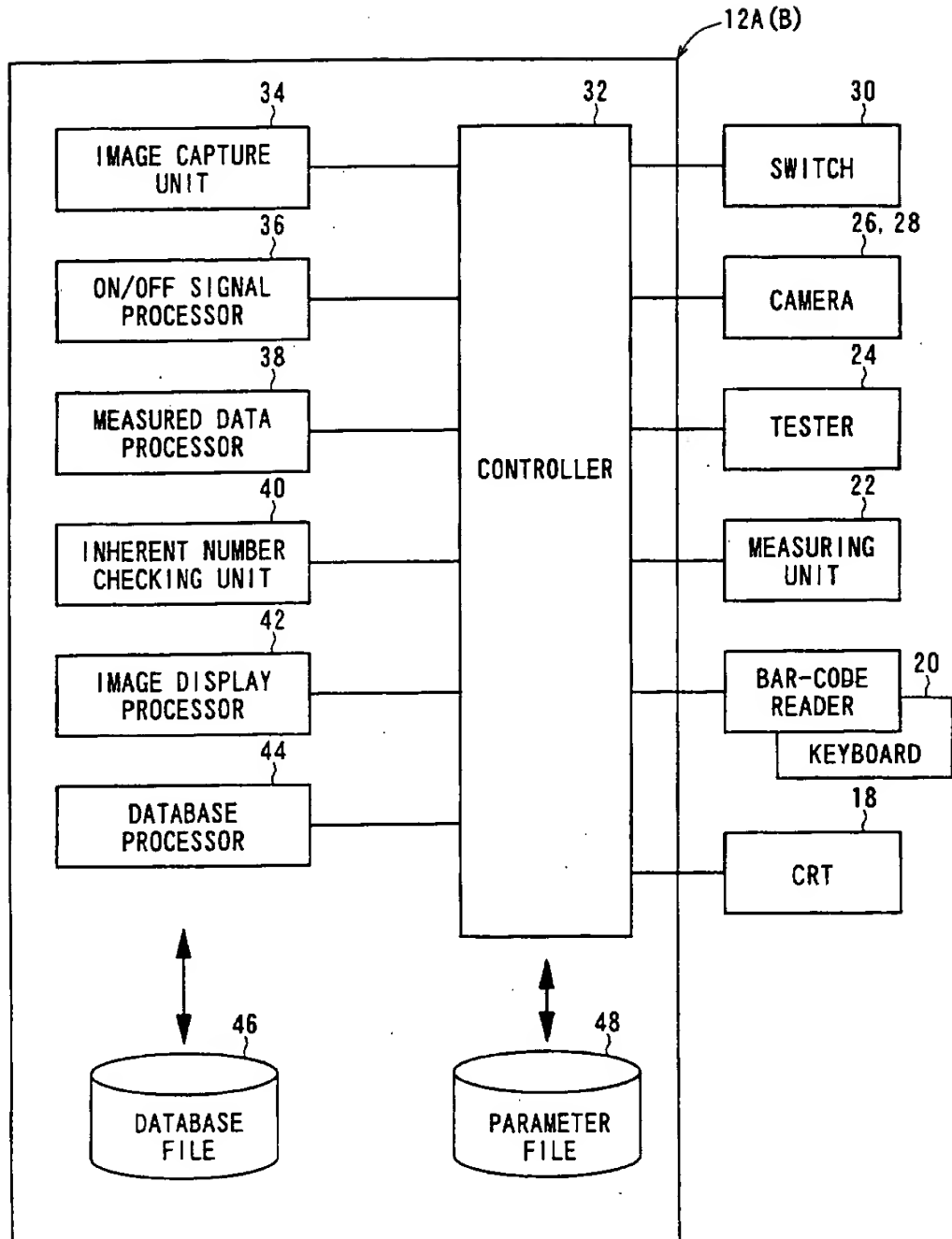


FIG. 3

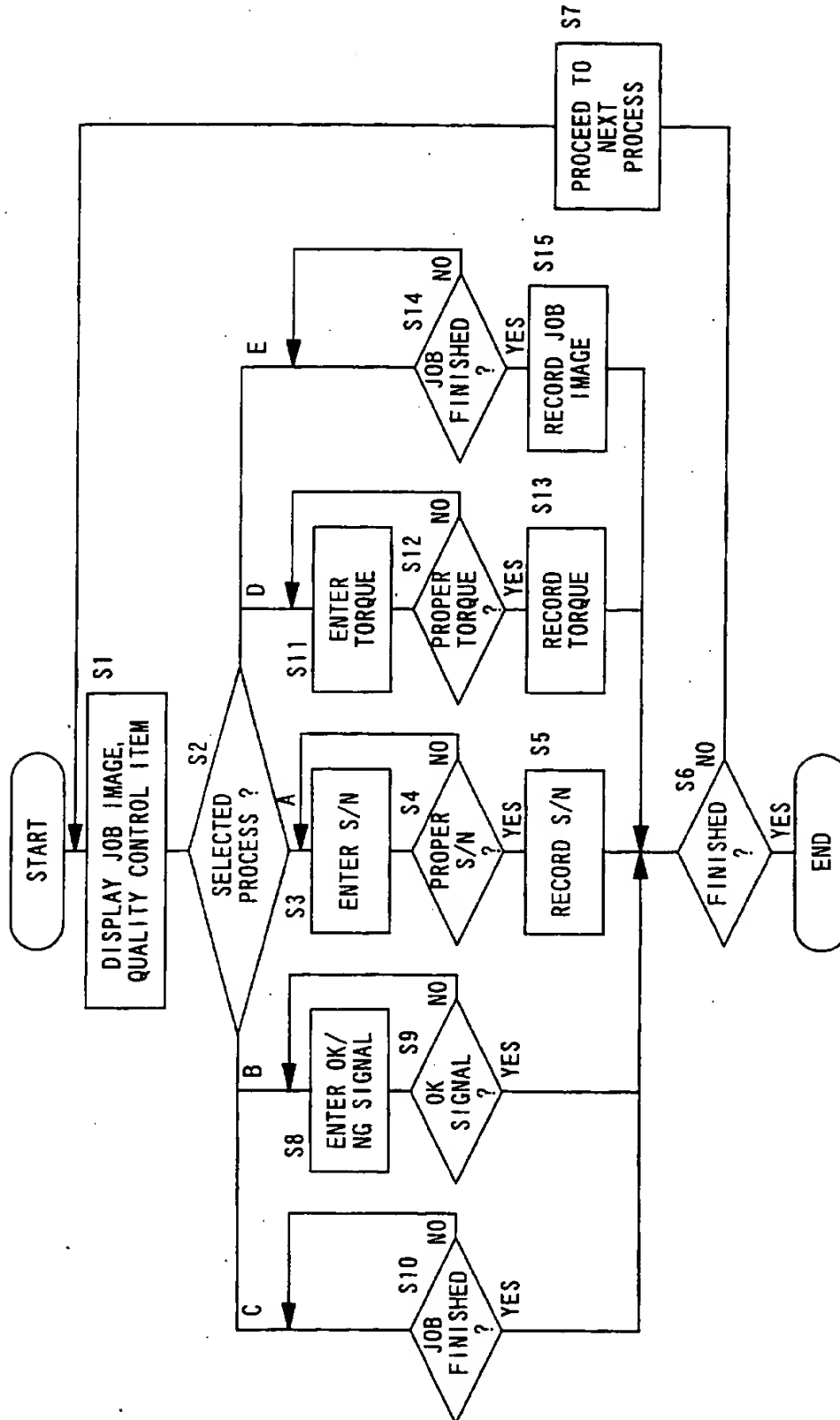


FIG. 4

4/15

50

54

JOB START

97/01/09 15:00:00

PROCESS No.

1 / 15

WORKER'S NAME

SUPERVISOR

PROCESS JOB QUALITY CONTROL ITEM

<SET HEAT SINK PDU/ENTER SERIAL NO. >

<BEWARE OF DIRECTION TO SET HEAT SINK PDU>

RECORD

01 HPDU0 102-0123

Enter Input

60

END

58

56

52

FIG.5

54

62

5/15

58

60

56

52

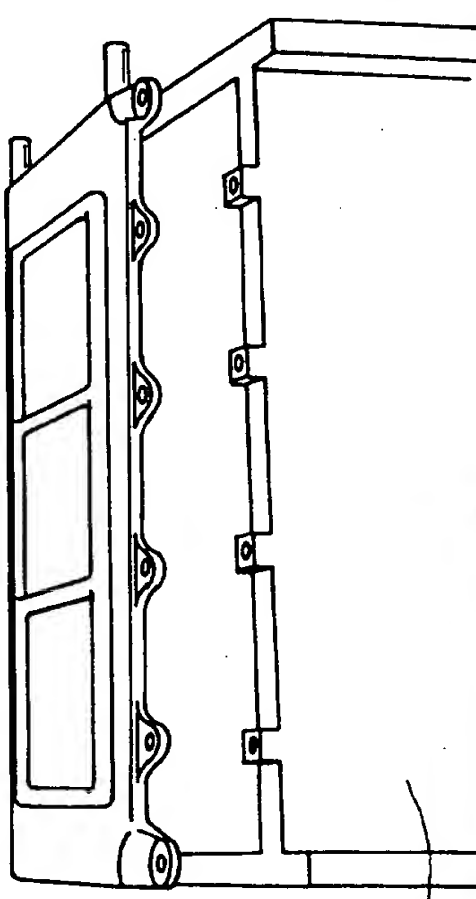
JOB START	97/01/09 15:00:00	PROCESS No.	1 / 15	WORKER'S NAME	SUPERVISOR
PROCESS JOB QUALITY CONTROL ITEM	<div>56</div> <div>52</div> 				
<div>RECORD</div> <div> <div>58</div> <div>58</div> <div>01 HPDUO 102-0123</div> <div>60</div> <div>DETERMINE</div> <div>END</div> </div>					

FIG. 6

64

54

JOB START	97/01/09 15:00:00	PROCESS No. 7 / 15	WORKER'S NAME	SUPERVISOR
PROCESS JOB	<div>56</div> <div>52</div>			
QUALITY CONTROL ITEM	<div>58</div> <div>60</div>			
<div>RECORD</div> <div> <div>01 HPDUO 234-1234</div> <div>Enter Input</div> <div>01 HPDUO 234-1232</div> <div>01 HPDUO 234-1233</div> </div> <div>END</div>				

6/15

FIG.7

54

66

JOB START	97/01/09 15:00:00	PROCESS No.	7 / 15	WORKER'S NAME	SUPERVISOR
PROCESS JOB QUALITY CONTROL ITEM	<div>56</div> <div>52</div>				
<div>58</div> <div>60</div>					
<div>END</div>					

FIG. 8

54

68

70

56

52

JOB START 97/01/09 15:00:00

PROCESS No. 6 / 15

WORKER'S NAME

SUPERVISOR

PROCESS JOB QUALITY CONTROL ITEM

INSPECT HEAT SINK PDU WITH PRESSURE LEAKAGE INSPECTING MACHINE

RECORD

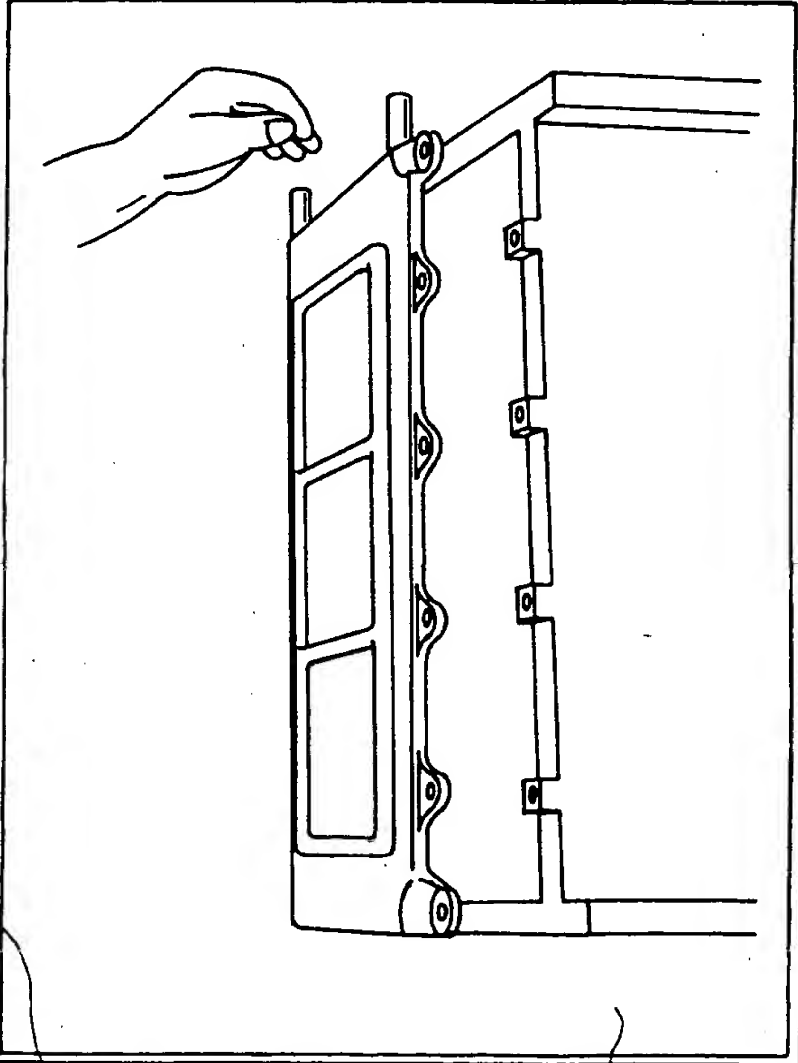
PRESSURE LEAKAGE INSPECTION

OK

NG

CARRY OUT INSPECTION

END



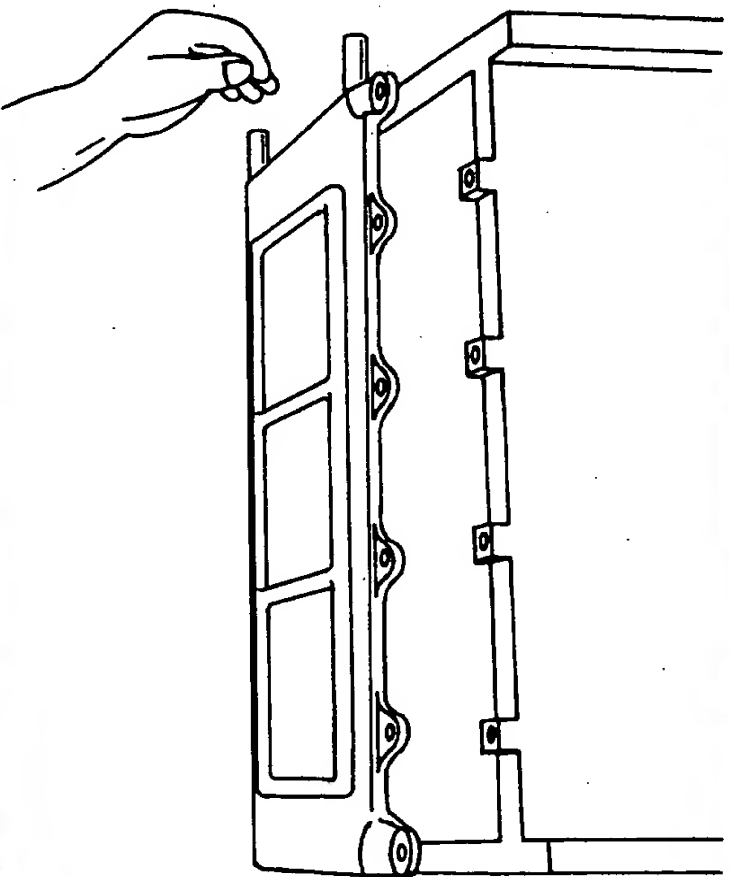
The diagram shows a hand holding a probe or tool, interacting with a heat sink PDU (Process Data Unit) mounted on a machine. The machine has a frame with multiple vertical supports and a horizontal base. The hand is positioned to inspect the top of the PDU.

FIG. 9 54

72

JOB START	97/01/09 15:00:00	PROCESS No.	6 / 15	WORKER'S NAME	SUPERVISOR
PROCESS JOB QUALITY CONTROL ITEM	INSPECT HEAT SINK PDU WITH PRESSURE LEAKAGE INSPECTING MACHINE				

56



52

70

RECORD

PRESSURE LEAKAGE INSPECTION

OK

NG

INSPECTION IS OK.
YOU MAY GO TO NEXT JOB.

Enter Next Job

END

FIG.10

74

54

JOB START 97/01/09 15:00:00

PROCESS No. 6 / 15

WORKER'S NAME

SUPERVISOR

PROCESS JOB QUALITY CONTROL ITEM

INSPECT HEAT SINK PDU WITH PRESSURE LEAKAGE INSPECTING MACHINE

56

52

RECORD

PRESSURE LEAKAGE INSPECTION

OK

NG

INSPECTION IS NG. INSPECT AGAIN.

END

FIG.11

76

54

JOB START 97/01/09 15:00:00 PROCESS No. 8 / 15

WORKER'S NAME SUPERVISOR

RECORD

56

52

COAT IGBT MODULE/DISCHEG UNIT ASSY WITH THERMAL COMPOUND

<3 IGBT MODULES>

<1 DISCHG UNIT ASSY>

QUALITY CONTROL ITEM

Enter Next Job

END

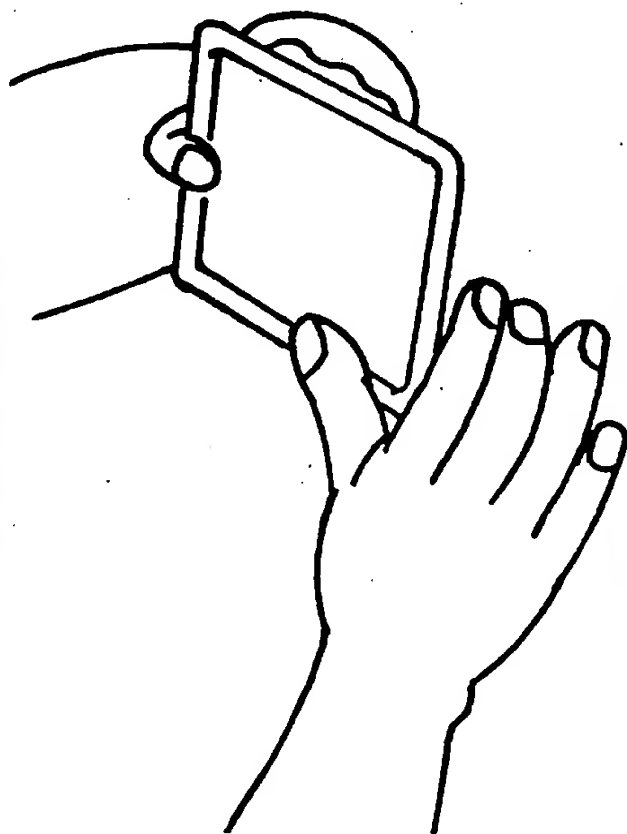


FIG.12 54

JOB START 97/01/09 15:00:00

PROCESS No. 8 / 15

WORKER'S NAME

SUPERVISOR

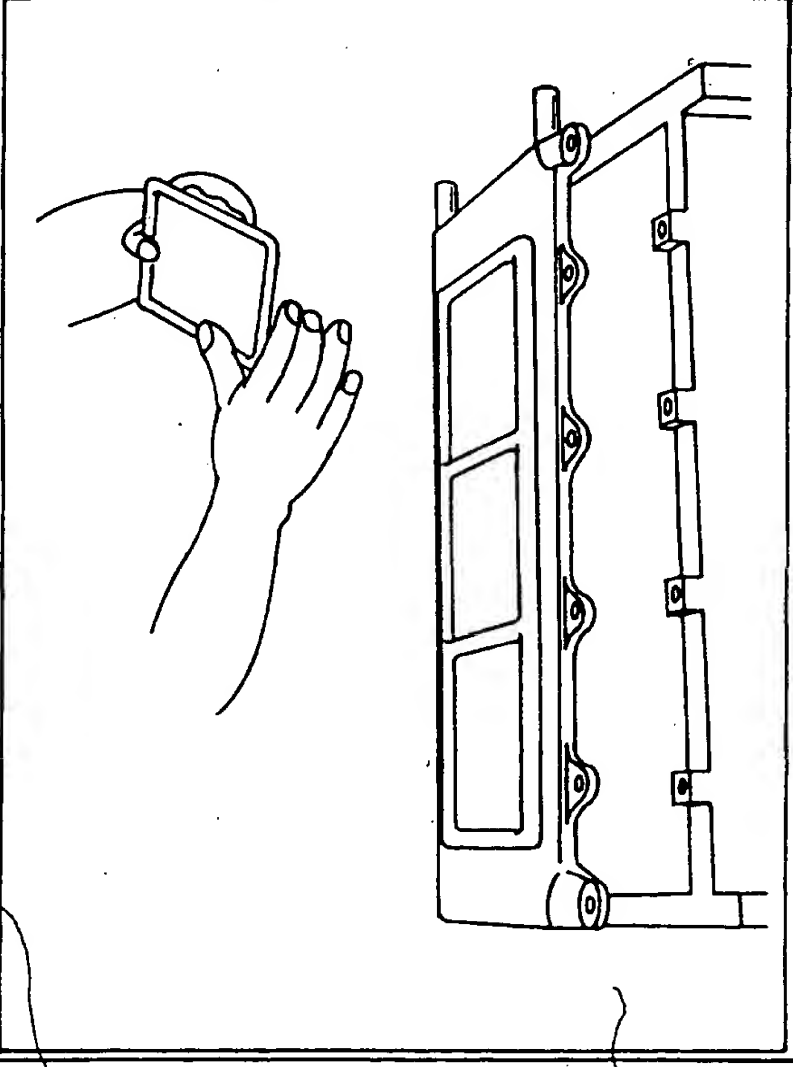
PROCESS JOB

QUALITY CONTROL ITEM


COAT IGBT MODULE/DISCHG UNIT ASSY WITH THERMAL COMPOUND

<3 IGBT MODULES>

<1 DISCHG UNIT ASSY>



RECORD



Enter Next Job

END

FIG.13

JOB START 97/01/09 15:00:00

PROCESS No. 11 / 15


PROCESS JOB CHECK TIGHTENING TORQUE

QUALITY CONTROL ITEM <4 BOLTS 6x20, TIGHTENING TORQUE: 9±1 Nm>

WORKER'S NAME

SUPERVISOR

RECORD



TIGHTENING TORQUE

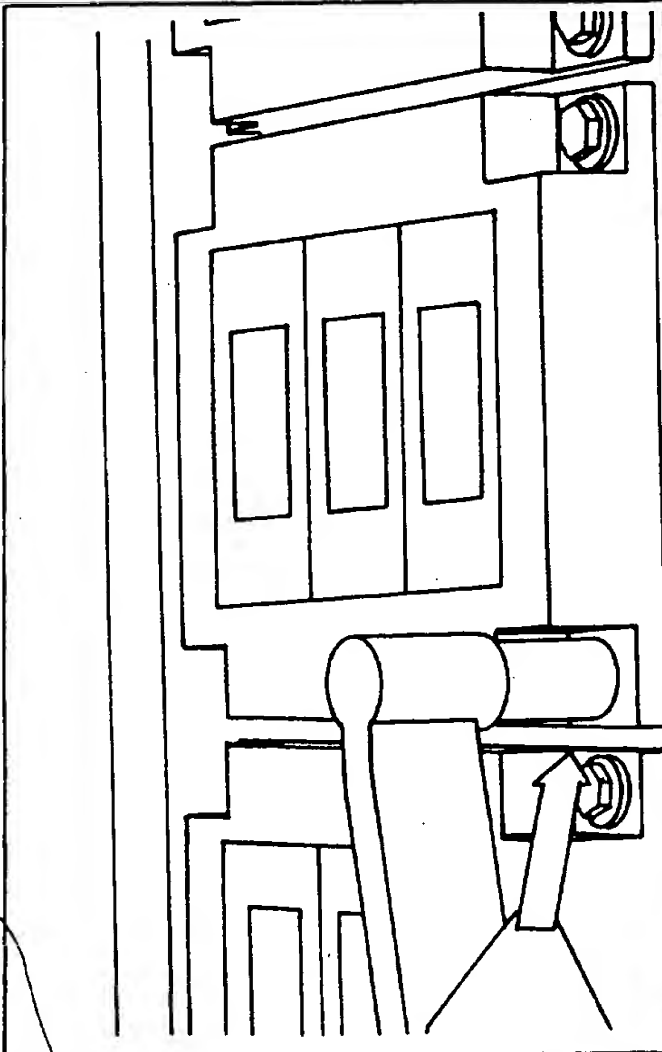
NUMBER 11

MEASURED VALUE 11

PRESCRIBED VALUE 9±1

/12 BOLTS

56



52

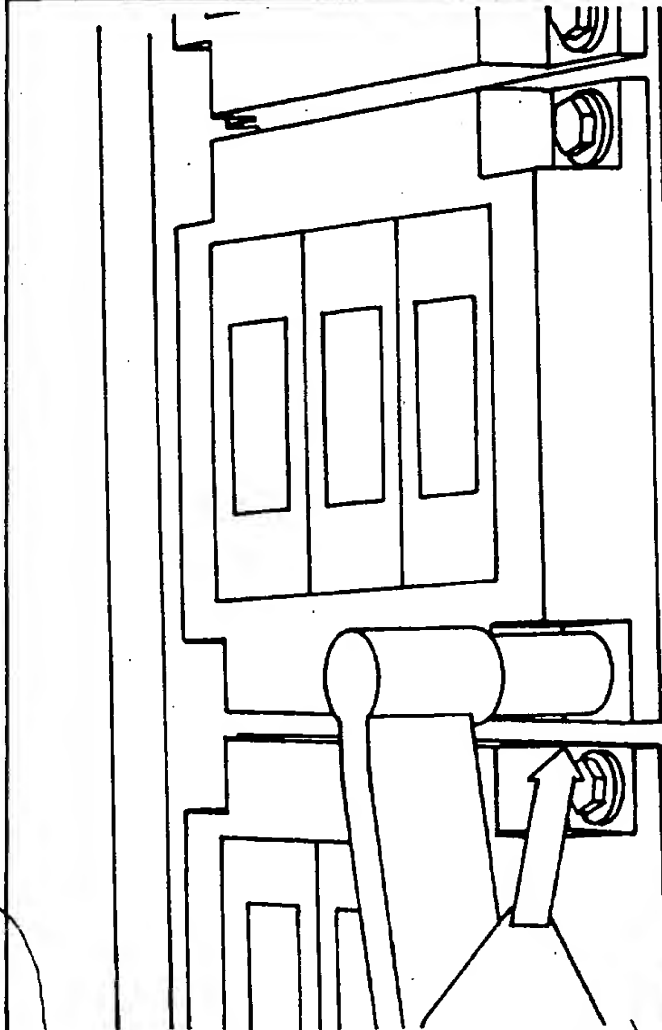
MEASURED TIGHTENING TORQUE IS NG.

MEASURE TORQUE AGAIN.

END

FIG.14 54

UPSTREAM → DOWNSTREAM 84

JOB START	97/01/09 15:00:00	PROCESS No.	11 / 15	WORKER'S NAME	SUPERVISOR												
PROCESS JOB	CHECK IGBT MODULE TIGHTENING TORQUE																
QUALITY CONTROL ITEM	<4 BOLTS 6×20, TIGHTENING TORQUE: 9±1 Nm>×<3 IGBT MODULES>																
																	
<p>RECORD</p> <p>TIGHTENING TORQUE</p> <p>NUMBER <input type="text" value="12"/> /12 BOLTS</p> <p>MEASURED VALUE <input type="text" value="9"/></p> <p>PRESCRIBED VALUE 9±1</p> <table border="1"> <tr> <td>9</td><td>9</td><td>9</td><td>9</td><td>8</td><td>9</td><td>9</td><td>9</td><td>8</td><td>10</td><td>9</td><td>9</td> </tr> </table> <p>MEASUREMENT OF TIGHTENING TORQUE IS FINISHED. JOB. YOU MAY GO TO NEXT JOB.</p> <p>Enter Next Job</p> <p>END</p>						9	9	9	9	8	9	9	9	8	10	9	9
9	9	9	9	8	9	9	9	8	10	9	9						

82

14/15

56

52

FIG.15

54

86

JOB START

97/01/09 15:00:00

PROCESS No.

9 / 15

WORKER'S NAME

SUPERVISOR

PROCESS JOB

QUALITY CONTROL ITEM

ATTACH IGBT MODULE

<4 BOLTS 6×20, TIGHTENING TORQUE: 9±1 Nm>
<BEWARE OF DIRECTION OF ATTACHMENT>

RECORD

88

56

52

Enter Next Job

END

JOB AIDING APPARATUS

The present invention relates to a job aiding apparatus for assisting a worker in accurately and efficiently working on a workpiece based on job details and job results displayed on a display unit and also allowing the worker to make easy decisions about job results.

Production lines for manufacturing products, such as automobiles, made of a large number of parts have a plurality of work stations each provided with an assembly manual which describes a work procedure and the numbers of parts assembled in the work station. The worker in each work station assembles desired parts by seeing the assembly manual.

Recent years have seen trends for the manufacture of many types of products in small quantities to meet various needs of users. To minimize investments in production facilities, one production line is supplied with mixed parts for a plurality of products of different kinds. The worker in each work station of such a production line assembles parts according to different assembly manuals for the respective types of products.

However, such a production process is

disadvantageous in that the workers cannot fully avoid errors in their job no matter how skilled they may be. For example, the worker in each work station may assemble parts in a wrong sequence or may put together parts of different products. Furthermore, in order to inspect a fastened bolt to see if the torque with which the bolt has been tightened is in a predetermined torque range, the worker reads the torque value from a torque meter and decides whether the torque value falls within the predetermined torque range that is given in the assembly manual. At this time, the worker may make an error in making such a decision.

There have heretofore been available an apparatus for displaying the video of a work procedure for the worker to avoid errors in the work procedure, an apparatus for displaying inspection data on a display unit for the worker to easily confirm the inspection data, and an apparatus for reading a number inherent in a part from the part for the worker to process the part according to an instruction given on the basis of the read number.

These apparatus have been independent of each other. For example, a work procedure is being displayed on a display unit, and the result of the job done according to the work procedure is displayed on another display unit. Therefore, since the worker is required to see both the display units, the work which the worker needs to perform

is so complex that the worker tends to cause errors.

Even when these apparatus are employed, it is impossible to completely get rid of errors. For example, when the worker tightens a plurality of bolts on a workpiece and then measures and confirms the torque of each of the bolts, the worker may measure the torque of one bolt a plurality of times. When such a mistake takes place, because there is no way of detecting which bolt has been measured twice, all the bolts have to be measured again.

On production lines, workpieces are processed without being stopped at work stations for higher production efficiency. Display units of the type described above are positioned at spaced intervals along the production lines. Since, however, many various devices other than those display units are also positioned alongside of the production lines, the layout of the display units is subject to significant limitations. Inasmuch as workpieces move downstream along the production lines, a display unit for displaying measured results in each work station needs to be located downstream of the other display units, so that the worker in each station can work on workpieces smoothly based on images displayed on the display units. This also poses a limitation on the layout of the display units.

It is a principal aim of the present invention to provide a job aiding apparatus for allowing a worker to confirm job details and job results with ease to avoid errors in the job.

Another aim of the present invention is to provide a job aiding apparatus for assisting a worker in accurately and efficiently working on a workpiece.

Still another aim of the present invention is to provide a job aiding apparatus which minimizes limitations on the layout of a display unit for displaying job details and job results.

Yet still another aim of the present invention is to provide a job aiding apparatus which prevents a worker from making errors in the manufacture of many types of products in small quantities.

The above and other aims, features, and advantages of the present invention will become more apparent from the following description when taken in conjunction with the accompanying drawings in which a preferred embodiment of the present invention is shown by way of illustrative example.

FIG. 1 is a perspective view of a portion of a production line which incorporates job aiding apparatus according to the present invention;

FIG. 2 is a block diagram of the job aiding

apparatus shown in FIG. 1;

FIG. 3 is a flowchart of an operation sequence of the job aiding apparatus shown in FIG. 1;

FIGS. 4 through 7 are views showing displayed job aid images for recording an inherent part number;

FIGS. 8 through 10 are views showing displayed job aid images for inspecting a workpiece;

FIG. 11 is a view showing a displayed job aid image of a certain working process at an enlarged scale;

FIG. 12 is a view showing a displayed job aid image of a certain working process at a reduced scale;

FIGS. 13 and 14 are views showing displayed job aid images for tightening a bolt; and

FIG. 15 is a view showing a displayed job aid image for confirming a job state.

FIG. 1 shows in perspective a portion of a production line which incorporates job aiding apparatus according to the present invention. As shown in FIG. 1, the production line has a first work station ST1 and a second work station ST2 which is positioned downstream of the first work station ST1 with respect to the direction in which workpieces flow along the production line. The first work station ST1 and the second work station ST2 have job aiding apparatus 12A, 12B, respectively. Workpieces W are fed downstream along the production line

by respective carriage carts 10. In the first and second work stations ST1, ST2, the workpieces W carried on the respective carriage carts 10 are processed by respective workers M using tools 14, parts 16, etc. as instructed by the job aiding apparatus 12A, 12B, respectively.

FIG. 2 shows in block form each of the job aiding apparatus 12A, 12B. As shown in FIG. 2, each of the job aiding apparatus 12A, 12B includes a display unit 18 such as a CRT or the like for displaying job details, job results, etc. with respect to the workpiece W, an input device 20 such as a keyboard, a bar-code reader, etc., a measuring unit 22, a tester 24, video cameras 26, 28 (see also FIG. 1) for recording video images of job states, a switch 30 for manually operating the video camera 26, 28.

Each of the job aiding apparatus 12A, 12B comprises a controller 32 connected to the display unit 18, the input device 20, the measuring unit 22, the tester 24, the video cameras 26, 28, and the switch 30, an image capture unit 34 for capturing images through the video cameras 26, 28, an ON/OFF signal processor 36 for processing ON/OFF signals from the tester 24 which detects whether there is a pressure leakage, etc. or not, a measured data processor 38 for processing measured data produced by the measuring unit 22 associated with the tool 14, which may be a torque wrench or the like, an inherent number checking unit 40 for checking inherent numbers of the workpieces W or the parts 16 which have

been entered by the input device 20, an image display processor 42 for displaying images on the display unit 18, and a database processor 44.

Each of inherent numbers is expressed in a format "AA BBBB CCC-DDDD" where "AA BBBB" indicates a product number and "CCC-DDDD" indicates an inherent number of a workpiece W or a part 16. Specifically, if a product to be manufactured is a motor vehicle, then "AA" indicates the type of the motor vehicle, "BBBB" indicates the type of an engine or the like mounted on the motor vehicle, "CCC" indicates a version number of a workpiece W or a part 16 of the engine, and "DDDD" indicates an inherent serial number of the workpiece W or the part 16.

To the database processor 44, there is connected a database file 46 which stores a database of decision data for making decisions about measured data, a database of inherent number data for checking inherent numbers of workpieces W and parts 16, and a database of image data to be displayed on the display unit 18. A parameter file 48 which stores parameters including addresses required for performing various processes.

A work procedure to be carried out by a worker M using the job aiding apparatus 12A, 12B will be described below with reference to FIG. 3.

The image display processor 42 displays a job aid image 50 (see FIG. 4) on the display unit 18 according to a work procedure read from the database file 46 by the

database processor 44 in step S1.

The job aid image 50 shown in FIG. 4 serves to assist the worker M in recording an inherent number of the workpiece W to be processed. The job aid image 50 includes a job image display area 52 for showing a job to be performed in the first work station ST1 or the second work station ST2, together with an image of the workpiece W, a process work display area 54 for showing a job detail, a quality control item display area 56 for showing a quality control item, a data entry area 58 for entering an inherent number, and a data display area 60 for displaying an entered inherent number.

In step S2, a process A is selected for recording an inherent number.

First, the worker M enters the inherent number, e.g., "01 HPDU0 102-0123", of the workpiece W transferred to the first work station ST1 or the second work station ST2 according to the information displayed in the process work display area 54 and the quality control item display area 56. The worker M may enter the inherent number that has been assigned to the workpiece W, through either the keyboard or the bar-code reader.

The entered inherent number is displayed in the data entry area 58. The inherent number checking unit 40 checks the entered inherent number to see if it is proper or not in step S4. Specifically, the inherent number checking unit 40 decides whether a workpiece W having an

inherent number corresponding to a product displayed in the job image display area 52 has been delivered to the first work station ST1 or the second work station ST2 or not by comparing high-order figures of the inherent number, e.g., "01 HPDU0" with inherent number data read from the database file 46.

If the entered inherent number is determined as a proper inherent number corresponding to the workpiece W displayed in the job image display area 52, then it becomes possible to point a key "Enter Input". When the worker M points the key "Enter Input", the inherent number is displayed in the data display area 60 in a job aid image 62 shown in FIG. 5, and recorded in the database file 46 by the database processor 44 in step S5. If the entered inherent number does not correspond to the displayed workpiece W, then the key "Enter Input" cannot be pointed, indicating to the worker M that the data has been entered by mistake or the transferred workpiece W is improper.

When the proper inherent number is entered, it is decided whether there is a next job in the first work station ST1 or the second work station ST2 or not in step S6. If there is a next job in the first work station ST1 or the second work station ST2, then a process for proceeding to a next job process is carried out in step S7, and then a job aid image 64 shown in FIG. 6 is displayed in step S1. The job aid image 64 serves to

prompt the worker M to enter the inherent number of a part 16 to be assembled on the workpiece W shown in FIGS. 4 and 5. Then, the worker M enters the inherent number in the same manner as described above.

The inherent number entered by the worker M is checked. Specifically, the inherent number checking unit 40 decides whether the workpiece W corresponds to the product by comparing high-order figures of the inherent number, e.g., "01 HPDU0" with inherent number data read from the database file 46. The inherent number checking unit 40 also decides whether low-order figures of the inherent number, e.g., "234-1234", overlap those of an inherent number already entered or not. If the entered inherent number is the same as an inherent number already entered (with figures "234-1233" overlapping) as indicated by a job aid image 66 shown in FIG. 7, then since the key "Enter Input" cannot be pointed, the entered inherent number cannot be recorded. The worker M now recognizes that the inherent number has been entered by mistake or the part 16 assembled on the workpiece W is improper. The worker M reenters a proper inherent number of a proper part in step S4.

As described above, it is checked whether the entered inherent number corresponds to a workpiece W displayed in the job image display area 52 or the entered inherent number is the same as an entered inherent number already entered, so that a wrong process is prevented in

advance from occurring.

After all inherent numbers have been entered, the display unit 18 displays a job aid image 68 relative to a process B which is a next job to be done, in step S1. In step S2, the process B is selected for inspecting the workpiece W.

The worker M inspects the workpiece W with the tester 24, for example, according to details displayed in the process work display area 54, the job image display area 52, and a pressure leakage inspection display area 70 in the job aid image 68. An inspected result produced by the tester 24 is supplied as an OK/NG signal via the controller 32 to the ON/OFF signal processor 36 in step S8.

If the inspected result indicates no pressure leakage (OK), then the letters "OK" displayed in the pressure leakage inspection display area 70 are highlighted in a job aid image 72 shown in FIG. 9, indicating to the worker M that workpiece W is free of a pressure leakage and that the worker M may go to a next job in step S9. When the worker M then points a key "Enter Next Job", the job aid image 72 changes to a next job aid image.

If the inspected result indicates a pressure leakage (NG), then the letters "NG" displayed in the pressure leakage inspection display area 70 are highlighted in a job aid image 74 shown in FIG. 10, indicating to the

worker M that workpiece W suffers a pressure leakage and prompting the worker M to inspect the workpiece W again. Since the key "Enter Next Job" (see FIG. 9) cannot be pointed, the worker M cannot proceed to a next process until the inspected result indicates no pressure leakage (OK).

After the workpiece W has been inspected, the display unit 18 displays a job aid image 76 relative to a process C which is a next job to be done, as shown in FIG. 11, in step S1. In step S2, the process C is selected, and then a predetermined job is performed on the workpiece W in step S10.

In the process C, the worker M coats the workpiece W with a compound, for example, according to a job air image 76 shown in FIG. 11 or a job air image 78 shown in FIG. 12. In the process C, a process such as an inspection process is not carried out. As shown in FIGS. 11 and 12, the job image display area 52 can be enlarged or reduced in size as desired by the worker M for better working efficiency.

When the worker M points the key "Enter Next Job" after the process C, the display unit 18 displays a job aid image 80 relative to a process D which is a next job to be done, as shown in FIG. 13, in step S1. The job aid image 80 includes a data display area 82 for displaying a measured value, a prescribed value which is an allowable value for the measured value, and data to be recorded.

In step S2, the process D is selected for tightening a part 16 on the workpiece W and recording a torque with which the part 16 is tightened.

First, the worker M tightens the part 16, which is a bolt, on the workpiece W at a predetermined position according to an image displayed in the job image display area 52, measures the torque with which the bolt is tightened with the measuring unit 22, and supplies the measured torque through the controller 32 to the measured data processor 38 in step S11.

The data display area 82 displays the measured torque and an allowable range for the measured torque. The measured data processor 38 compares the measured torque with data of the allowable range. If the measured torque does not fall within the allowable range, then the data display area 82 displays information indicating that the measured torque is not a proper torque, prompting the worker M to measure the torque again in step S12. If the measured torque falls within the allowable range, then the data display area 82 displays information indicating that the measured torque is a proper torque, as indicated by a job aid image 84 shown in FIG. 14. The measured torque is recorded in the database file 46 in step S13. Then, a job aid image relative to a next job is displayed in step S1. The job image display area 84 can also be enlarged or reduced in size as desired by the worker M for better working efficiency.

Since the measured torque is automatically checked to see if it falls within the allowable range or not, the worker M is prevented from making decision errors. When the measured torque does not fall within the allowable range, the worker M can determine how far the measured torque is from the allowable range, which may be used as a criteria for measuring the torque again.

Because the job air images 50, 62, 64, 66, 68, 72, 74, 76, 78, 80, 84 include the job image display area 52 and the data display areas 60, 82, 70, which are displayed simultaneously, the worker M can perform jobs and confirm job details and job results while referring to the display unit 81 only. Furthermore, the job image display area 52 displays an image of the workpiece W as viewed from the worker M. Therefore, the worker M is not required to mentally convert a displayed image for grasping working spots as when the image is captured as viewed from the workpiece W so as to include the worker M. Consequently, the worker M can easily and reliably perform jobs to be done.

On the display unit 18, job details are displayed upstream with respect to the direction of the production line, and job results are displayed downstream with respect to the direction of the production line. This display layout allows the worker M to confirm the job details and results from an optimum position with respect to the workpiece W which is moving downstream along the

production line. For example, as shown in FIG. 14, the job image display area 52 is displayed upstream with respect to the direction of the production line, and the data display area 82 is displayed downstream with respect to the direction of the production line.

The worker M tightens a bolt as a part 16 on the workpiece W at a predetermined position according to details displayed in the process work display area 54 and the quality control item display area 56 in the job aid image 84, while being assisted by a job detail image displayed in the job image display area 52. The worker M then measures the torque with which the bolt is tightened, and supplies the measured torque through the controller 32 to the measured data processor 38. During this time, the workpiece W is being transferred downstream. Then, the downstream data display area 82 displays the measured torque and its allowable range. The measured data processor 38 compares the measured torque with the allowable range. If the measured torque does not fall within the allowable range, then the measured data processor 38 displays that the measured torque is an improper torque, prompting the worker M to measure the torque again. At this time, the worker M is moving downstream with the workpiece W, and can confirm the job result image displayed in the data display area 82 which is displayed in the downstream region of the display unit 18.

If the job detail image displayed upstream of the job result image is already unnecessary when the job result image is displayed, then only the job result image may be displayed at an enlarged scale on the display unit 18. The worker M can confirm the job result easily based on the enlarged job result image.

In the processes A - D described above, video images of job states may be recorded by the video cameras 26, 28, and may be played back in a playback image display area 88 in a job aid image 86 shown in FIG. 15. The worker M may operate the switch 30 to capture a desired image for confirmation.

In the process D, for example, a number of bolts need to be tightened, and their torques need to be measured. During the process D, the worker M may erroneously measure the torque of one bolt twice. If the worker M erroneously measures the torque of a bolt twice, then a process E is also selected, and the torque measuring process is imaged by the video cameras 26, 28, and recorded by the image capture unit 34 in steps S14, S15. Thereafter, the recorded torque measuring process is displayed in the playback image display area 88 to locate the wrong torque measurement, so that the worker M can take an appropriate corrective action. The video cameras 26, 28 are positioned for taking different images depending on workpiece locations to be processed, and can automatically or manually be switched by the switch 30.

depending on the workpiece location where the worker M processes the workpiece W. Since the worker M processes only the erroneous job based on the image that is being played back, the worker M can perform necessary jobs highly efficiently.

Although a certain preferred embodiment of the present invention has been shown and described in detail, it should be understood that various changes and modifications may be made therein without departing from the scope of the appended claims.

CLAIMS

1. A job aiding apparatus comprising display means disposed near a working position of a worker, for simultaneously displaying a job detail display image for showing a job detail to be performed on a workpiece and a job result display image for showing a job result of the job detail shown by said job detail display image.

2. A job aiding apparatus according to claim 1, wherein said job detail display image displays a job detail with respect to the workpiece as viewed from the working position of the worker.

3. A job aiding apparatus according to claim 1, wherein said job detail display image can be displayed at an enlarged scale and a reduced scale.

4. A job aiding apparatus according to claim 1, wherein said job result display image displays data of the job result.

5. A job aiding apparatus according to claim 4, wherein said data comprises an inherent number of the workpiece entered by the worker or an inherent number of a part used on the workpiece.

6. A job aiding apparatus according to claim 4,
wherein said data comprises measured data.

7. A job aiding apparatus according to claim 1,
wherein said job result display image displays an image
indicative of whether the job result is acceptable or not.

8. A job aiding apparatus according to claim 1,
wherein said job detail display image is displayed
upstream of said job result display image on said display
means with respect to a production line associated with
the job aiding apparatus.

9. A job aiding apparatus according to claim 1,
wherein said display means is disposed in each of work
stations of a production line associated with the job
aiding apparatus.

10. A job aiding apparatus comprising:
display means disposed near a working position of a
worker; and
recording means for recording a job state with
respect to a workpiece in the working position;
said display means comprising means for displaying a
job detail display image for showing a job detail to be
performed on the workpiece, a job result display image
for showing a job result of the job detail shown by said

job detail display image, and a job state image recorded by said recording means.

11. A job aiding apparatus according to claim 10, wherein said recording means comprises a plurality of recording means disposed in different positions, respectively, for recording images of the workpiece at different positions, respectively, thereon.

12. A job aiding apparatus according to claim 10, wherein said display means comprises means for displaying an inherent number of the workpiece entered by the worker or an inherent number of a part used on the workpiece.

13. A job aiding apparatus substantially as hereinbefore described with reference to any of Figures 1 to 15 of the accompanying drawings.



Application No: GB 9815072.5
Claims searched: at least 1 and 10

Examiner: Roland Whaite
Date of search: 6 November 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.P): G5G (G13, G17); G3N (NGBC3, NG1A1)
Int CI (Ed.6): G09B 19/00
Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	US 4359319 G B GREEN/LORAL Corpn	1 and 2
X	GB 1419064 W R CLARKE (see especially Figs 1 to 3)	1,3 and 10
X	GB 1569065 J M WEBER (see especially Figs 14 to 16 and description, page 5)	1,4 and 10
X	US 5475797 GLASPY/XEROX Corpn (See especially flow diagram of Figs 7A-7D)	10
X	GB 1254445 SUNDSTRAND Corpn (see especially page 2, line 56 to page 3 line 17)	5,12

X Document indicating lack of novelty or inventive step
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